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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/954,770	09/18/2001	Yuri A. Ivanov		8543

7590

08/03/2004

Patent Department  
Mitsubishi Electric Research Laboratories, Inc.  
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EXAMINER

AN, SHAWN S

ART UNIT

PAPER NUMBER

2613

DATE MAILED: 08/03/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

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# Office Action Summary

Application No.

09/954,770

Applicant(s)

IVANOV ET AL.

Examiner

Shawn S An

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-20 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,677,982) in view of Burt (5,473,364) and Yang (6,700,999 B1).

**Regarding claims 1, 9, 14, and 15**, Chen et al discloses a system/method for identifying a location of an object in a physical scene comprising:

means for identifying a first and a second virtual surface being planar in the physical scene (Fig. 1, 704);

means for analytically constructing an approximate disparity set of the first/second virtual surface (Fig. 1, 706);

a stereo camera including camera parameters acquiring a main and a reference image of the scene (Fig. 2); and

means for warping the reference image according to the first/second disparity set (716);

Chen et al does not particularly disclose means for subtracting each pixel of the warped reference image from a corresponding pixel of the main image to determine a depth residual of each pixel, and means for identifying each pixel having a non-zero depth residual with a surface of the object not being coincident with the virtual surface.

However, Burt teaches a video technique comprising means for subtracting (Fig. 3, 310) each pixel of the warped reference image (306) from a corresponding pixel of the main image (300-2) to determine a depth residual of each pixel.

Furthermore, Yang teaches means (binary segmentation mask) for identifying each pixel having a substantial non-zero value with a surface of the object (face) not being coincident with the virtual surface (background)(Fig. 1, P160 and Fig. 2).

Therefore, it would have been obvious to a person of ordinary skill in the art employing a system/method for identifying a location of an object in a physical scene as taught by Chen et al to incorporate the Burt's teaching so as to subtract each pixel of the warped first/second reference images from a corresponding pixel of the main image to determine a first and a second depth residual of each pixel and also incorporate the Yang's teaching so as to identify each pixel having a non-zero depth residual with a surface of the object not being coincident with the virtual surface for an efficient depth segmentation in a physical scene, thereby being able to distinguish foregrounds from backgrounds.

**Regarding claims 2 and 16**, Chen et al teaches the virtual surface (background) having an associated margin to form a virtual volume (depth or 3-D) near the virtual surface with a thickness equal to the margin (abs.).

**Regarding claims 3-4, 17 and 18**, Yang teaches an arbitrary surface (background) defined as partially tangible and partially in a space of the physical scene (col. 6, lines 27-39).

**Regarding claims 5 and 19**, Yang teaches binary segmentation mask (col. 6, lines 27-39), and comparing each pixel entry to a predetermined threshold so as to determine either the face region (object) or the background. Therefore, it would have been obvious to set each depth residual less than a predetermined threshold to zero, and set all other depth residuals to one to generate a binary segmentation mask.

**Regarding claims 6 and 20**, Burt teaches moving object in a stereo video of the scene (Fig. 3), and Yang teaches binary segmentation mask as discussed above.

**Regarding claim 7**, the Examiner takes official notice that applying polynomial interpolation to generate a disparity (displacement) is conventionally well known in the art. Note (6,141,104; abs.).

Therefore, it would have been obvious to apply polynomial interpolation to generate a disparity by acquiring a set of point correspondence from a calibration pair of images.

**Regarding claim 10**, Chen et al teaches a touching of the virtual surface by the object from the depth disparities (abs.).

**Regarding claim 11**, the Examiner takes official notice that a projector is conventionally well known in the art.

Therefore, it would have been obvious to illuminate the scene and the object with a dynamic projector so as to enhance the lighting.

**Regarding claim 12**, Yang teaches contrast image (P422-6).

**Regarding claim 13**, Yang teaches performing segmentation (Fig. 1, P330).  
Chen et al discloses the virtual volume (abs.).

Therefore, it would have been obvious to perform volume segmentation according to virtual volume to locate an object.

### ***Allowable Subject Matter***

3. Claim 8 is objected to as being dependent upon a rejected base claim 1, but would be allowable: if claim 8 is rewritten in independent form including all of the limitations of the base claim 1 and any intervening claims.

Dependent claim 8 recites the novel features comprising a linear system having an equation (see claim 8).

Accordingly, if the amendments are made to the claims listed above, and if rejected claims are canceled, the application would be placed in condition for allowance.

### ***Conclusion***

4. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

A) Schulz et al (6,141,104), System for determination of a location in 3-D space.

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B) Madden et al (6,297,825 B1), Temporal smoothing of scene analysis data for image sequence generation.

C) Chiang et al (6,144,701), Stereoscopic video coding and decoding apparatus and method.

D) Cahill et al (6,507,665 B1), Method for creating environment map containing information extracted from stereo image pairs.

5. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Shawn S An whose telephone number is 703-305-0099. The examiner can normally be reached on Flex hours (10).

6. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



SSA

Primary Patent Examiner

7/29/04